

Lifestyle modification and hypertension prevention

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Abstract

BACKGROUND: Hypertension, a clear risk factor for cardiovascular diseases, affects nearly one billion people worldwide. Recent statistics have reported increasing mortality due to hypertension which reveals the importance of prophylactic strategies in controlling blood pressure. Lifestyle changes are one of the most effective ways to prevent and control hypertension.

METHODS: This study was a comprehensive literature review performed through searches in databases such as Medline, PubMed, Science Direct, Scopus, and Google Scholar using the terms "lifestyle", "hypertension", "lifestyle modification", "risk factors for hypertension", "nonpharmacologic treatment of hypertension", and "dietary and activity factors".

RESULTS: Lifestyle factors such as dietary behaviors and physical activity are associated with hypertension. Several studies have indicated direct and indirect associations between overweight and increased risk of hypertension. Increased consumption of grains, fruits, vegetables, and milk and reduced consumption of sodium, fat, and alcohol are effective in preventing and controlling hypertension. In addition, some studies have reported a 35% reduction in risk of developing hypertension among individuals who engage in regular physical activity compared to sedentary people.

CONCLUSION: Since lifestyle- and diet-related factors are often modifiable, perceptions of their effects have specific importance in hypertension prevention and treatment.

Keywords: Blood Pressure, Lifestyle, Overweight, Physical Activity, Nutrition

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Introduction

Hypertension is an increasingly important medical and public health issue. It is among the most important life-threatening conditions in both industrial and developing countries.¹ While as many as 1 billion cases of hypertension are estimated worldwide, approximately 7.1 million deaths annually may be attributable to hypertension. The World Health Organization (WHO) reported that hypertension is responsible for 62% of cases of cerebrovascular disease and 49% of cases of ischemic heart disease. In addition, hypertension is the topmost risk factor for death worldwide.² Moreover, hypertension is a main risk factor for stroke and coronary heart disease and a major contributor to the onset and progression of chronic heart and kidney failure.³

Various studies have indicated that the prevalence of hypertension and its related clinical events and complications (e.g. myocardial infarction and stroke) appear to be increasing. The prevalence of hypertension in Saudi Arabia is about 10% and a third of the cases is poorly controlled.²

Although hypertension is an important and common cardiovascular disease risk factor,⁴ it is not always taken seriously and is often poorly controlled.⁵ Undiagnosed, untreated, and uncontrolled hypertension place a substantial strain on the healthcare delivery system.^{6,7} One reason for underdiagnosis is lack of symptoms which can leave people unaware of their high blood pressure.⁸ The Canadian Heart Health Survey (1985-92) found that while 22% of adults 18-74 years of age had high blood pressure, 43% of them were unaware they had hypertension, 22% were aware but untreated, 21% were treated but not controlled, and only 13% were treated and controlled.⁸

Increased blood pressure is the leading cause of death and the second leading cause of disability worldwide.⁹ Each year, hypertension is responsible for approximately 6 million disability-adjusted life years (DALYs) in the European Union.¹⁰ Over 90% of those living an average life span are expected to develop hypertension⁴ which is largely reflective of their sedentary behavior, poor dietary habits, and obesity.^{11,12} Much of the risk associated with

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hypertension can be prevented by establishing effective blood pressure control measures.¹³

Although there is increasing emphasis on treatment with medication, lifestyle modification is an important part of hypertension management.^{14,15} Blood pressure increases with weight, excessive alcohol consumption, and high sodium intake but decreases with regular physical activity.¹⁶

Lifestyle modification is the foundation of preventive management in individuals with cardiovascular disease risks such as obesity, hypertension, dyslipidemia, and diabetes.¹⁷ In hypertensive individuals, lifestyle modification can be recommended as an initial treatment before the start of drug therapy and as an adjunct to medication in those already on drug therapy. In hypertensive individuals with medication-controlled blood pressure, lifestyle modification may facilitate drug step-down and drug withdrawal in highly motivated individuals who achieve and maintain lifestyle changes. In nonhypertensives, lifestyle modification has the potential to prevent hypertension, and more broadly, to reduce blood pressure and thus lower the risk of blood pressure-related clinical complications in general populations. In fact, even an apparently small reduction in blood pressure, if applied to an entire population, may have an enormous beneficial effect on cardiovascular events. For instance, a 3-mmHg reduction in systolic blood pressure could lead to an 8% reduction in stroke mortality and a 5% reduction in mortality from coronary heart disease.¹⁸

Adoption of healthy lifestyle is critical for the prevention of high blood pressure and is an indispensable part of the management of individuals with hypertension.² The purpose of this article was to evaluate lifestyle modification factors and their relationship to the prevention of hypertension.

Materials and Methods

We reviewed numerous studies about lifestyle modification factors and the prevention of hypertension. Online literature searches were performed to identify published studies on lifestyle modification in hypertension. We searched Medline, PubMed, Science Direct, and Scopus using the terms "lifestyle", "hypertension", "risk factors for hypertension", "nonpharmacologic treatment of hypertension", "lifestyle modification", and "dietary and activity factors". The searches were performed on studies published between 2000 and 2011, from the dates of origin of each database. This study included review articles, systematic review articles, randomized

controlled trials (RCT), the Dietary Approaches to Stop Hypertension (DASH), and the seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure (JNC 7) guidelines/recommendations, and expert panel discussions.

Discussion

Hypertension affects many people worldwide and available evidence suggests a beneficial influence of lifestyle modification and dietary interventions. The challenge for healthcare decision makers and healthcare providers is to devise and implement clinical and public health strategies that help promote and maintain a combination of healthy diets and additional lifestyle modifications. Previous efforts to prevent morbidity and mortality from hypertension have focused mainly on the management of individuals with existing diseases.

Lifestyle modifications are an important part of hypertension management and include weight reduction, following the DASH eating plan with sodium restrictions, daily physical activity, and moderate alcohol consumption. In addition, all patients should be advised to stop smoking to reduce the risk of cardiovascular diseases.^{19,20} The JNC 7 advises primary care practitioners to recommend lifestyle modifications for all their prehypertensive and hypertensive patients (Table 1).⁷

Previous studies have shown that reducing dietary sodium by approximately 1700 mg (75 mmol) per day can lower systolic blood pressure by 4-5 mmHg in hypertensive individuals and by 2 mmHg in normotensive individuals.^{21,22} Reducing sodium intake may lessen the need for antihypertensive drugs. Some clinical trials have suggested that increasing dietary potassium by approximately 2100 mg (54 mmol) per day can reduce systolic blood pressure by 4-8 mmHg in hypertensive individuals and by 2 mmHg in normotensive individuals. Potassium-rich whole foods, such as bananas, kiwi fruit, avocado, potatoes (with skin), nuts, and yogurt, are more effective in reducing blood pressure than potassium supplements which are potentially toxic.²³ High potassium intake can produce hyperkalemia in people with impaired renal function and is therefore recommended only for individuals with normal renal function.²³

Studies have suggested several possible mechanisms by which lifestyle modifications may decrease blood pressure. These mechanisms include reduced oxidative stress due to decreased intake of saturated fats, endothelium-dependent vascular

Table 1. Recommendations of the seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure (JNC 7) and the associated reductions in systolic blood pressure (SBP)

Modification	Recommendation	SBP Reduction Range*
Weight reduction	Achieve and maintain normal body weight as measured by body mass index. Normal values range from 18.5-24.9 kg/m ² .	5-20 mmHg per 10 kg weight loss
DASH eating plan	Adopt a diet rich in fruits, vegetables, and low-fat dairy products with reduced amount of saturated fat (DASH† eating plan is high in fiber, low in total and saturated fat, low in sodium, and high in potassium)	8-14 mmHg
Dietary sodium reduction	Reduce dietary sodium intake to ≤ 100 mmol/day (2.4 g sodium or 6 g sodium chloride)	2-8 mmHg
Aerobic physical activity	Regular aerobic physical activity (e.g. brisk walking) at least 30 minutes/day, most days of the week	4-9 mmHg
Moderation of alcohol consumption	Men should drink less than 3 drinks per day. Women and lighter-weight men should not drink more than 1 drink per day (1 drink = 12 oz beer, 5 oz wine, 1.5 oz 80-proof alcohol).	2-4 mmHg

*Effects of modifications are dose- and time-dependent.

† DASH: Dietary Approaches to Stop Hypertension

relaxation due to increased potassium intake, and increased magnesium and calcium intake due to greater fruit and vegetable consumption.²⁴

Numerous studies have evaluated the effect of lifestyle modification on blood pressure. A recent meta-analysis of 27 randomized trials documented a 4 mmHg net reduction in systolic blood pressure among Indonesian individuals assigned to an aerobic exercise program.²⁵ Interestingly, the magnitude of the change in blood pressure appeared to be independent of exercise intensity.¹⁸ Regular exercise is associated with an increase in high-density lipoprotein cholesterol and reductions in body weight, waist circumference, body fat percentage, insulin resistance, systemic vascular resistance, plasma noradrenaline, and plasma renin activity. A meta-analysis by Fagard and Cornelissen on the effects of dynamic aerobic endurance training or resistance training in hypertensive and normotensive patients showed that resistance training was associated with significant reductions in blood pressure and cardiovascular risks, such as systemic vascular resistance, norepinephrine levels, and plasma renin activity.²¹ In a meta-analysis on the effects of resistance training on resting blood pressure, the authors concluded that moderate intensity resistance training may be an effective intervention for preventing and combating hypertension.⁷ Thus, exercise is a cornerstone for prevention, treatment, and control of blood pressure.

Observational studies and clinical trials have indicated that weight is positively associated with

blood pressure and hypertension. The importance of this relationship is highlighted by the increasingly high prevalence of overweight and obesity throughout the world. Almost every clinical trial that has examined the influence of weight loss on blood pressure has documented weight reduction to lower blood pressure.¹⁸ Every 1% decrease in body weight lowers systolic blood pressure by an average of 1 mmHg.²⁶ Surprisingly, reductions in blood pressure occur before (and sometimes without) achieving desirable body weights.¹⁸ In a meta-analysis, Dickson examined the effects of multiple lifestyle factors on blood pressure in hypertensive adult patients (systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 85 mmHg). The authors found that an improved diet (according to DASH) and aerobic exercise reduced systolic blood pressure by 5.0 mmHg and 4.6 mmHg, respectively. On the other hand, restrictions in alcohol and salt intake lowered systolic blood pressure by 3.8 mmHg and 3.6 mmHg, respectively. The authors suggested that hypertensive patients should follow a weight-loss diet, participate in regular exercise, and restrict their salt and alcohol consumption.²⁷ In another study, Viera et al. found a significant mean weight reduction and an increase in physical activity among males and females who participated a 15-month lifestyle intervention compared to the control group.¹⁷

In contrast to the direct relationship of salt intake with blood pressure, high levels of potassium are associated with low blood pressure. Although

observational data has been reasonably consistent, data from individual clinical trials have been less consistent and persuasive.^{18,23} In a meta-analysis, He and MacGregor examined the effects of restricting salt intake on blood pressure in children (≤ 18 years). In this study, salt reduction was associated with significant reductions in systolic blood pressure.²⁸ Viera et al concluded that a relatively intense 27-month intervention program was effective in improving lifestyle behaviors and decreasing cardiovascular disease risks by the end of the program.¹⁷

The relationship between high alcohol consumption (typically 3 or more drinks daily) and elevated blood pressure has been documented in many epidemiologic studies. Trial studies have also reported that reductions in alcohol drinking can lower blood pressure in normotensive and hypertensive male heavy drinkers.¹⁸

Despite the beneficial effects of preventing hypertension and reducing blood pressure, designing and implementing effective strategies that lead to sustained lifestyle modifications are difficult.²⁹ There are many barriers to the adoption of therapeutic lifestyle changes (TLC) aimed at improving blood pressure control.^{30,31} We grouped factors into categories focusing on the patient, provider, therapy, and medical/physical environment. We then assessed the relationships between these categories (Figure 1). Various demographic, psychological, and

sociocultural factors influence the extent to which patients incorporate TLC into their daily lives. In addition, providers may not be familiar with the guidelines for hypertension management, and patient access to care may be limited by the lack of insurance or by transportation problems in getting to the doctor's office. Similarly, the number and complexity of therapy-related factors associated with TLC (e.g. the extent of dietary change and having to address smoking, diet, and exercise simultaneously) may reduce adherence. Adverse effects such as injuries may limit adherence to an exercise regimen, while cost may affect food choices. The manner in which providers view their relationship with their patients will influence their approach to sharing information and responding to the needs articulated by the patient. Providers should elicit information to assess the specific barriers in each individual case.²⁹

There are 3 wide-range strategies to overcome barriers to TLC in hypertension management: 1) empowering patients; 2) enhancing cultural competence of providers; and 3) targeting multiple factors. Empowering patients involves patient-centered care that emphasizes self-management supported by providers, family, and the community. Increasing the cultural competence of providers and healthcare organizations enhances the use of strategies addressing the heritage, beliefs, and behaviors of those receiving care. The likelihood of

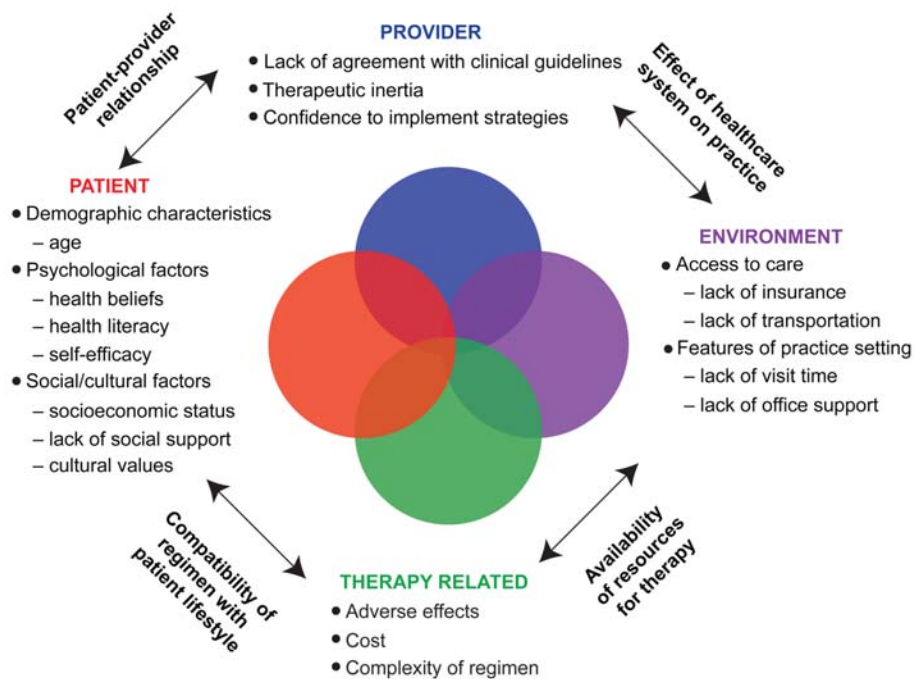


Figure 1. Barriers to the adoption of therapeutic lifestyle changes

success is increased by simultaneously targeting multiple factors. At patient level, assessing sociocultural factors (e.g. socioeconomic status, health beliefs, health literacy, and health knowledge) may help identify individual barriers and enhance TLC interventions. At provider level, an effective relationship between the patient and the provider is crucial to effective interventions. Changes across health systems and public policy decisions are needed to cause meaningful changes in the delivery of hypertension care.²⁹

Conclusion

Lifestyle modification through changes in eating patterns, moderating alcohol intake, weight loss, and regular physical activity forms part of an important and effective first-line treatment strategy for hypertension. Regardless of other indicated treatments, all patients who need to lower their blood pressure should be given advice and support to achieve and maintain healthy behaviors. Therefore, therapeutic lifestyle modification interventions should emphasize patient self-management that is supported by providers, family, and the community. Interventions should be tailored to match an individual's cultural heritage, beliefs, and behavioral norms. It should also be emphasized that motivation for preventing and treating hypertension is important for both the individual and the society.

Conflict of Interests

Authors have no conflict of interests.

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